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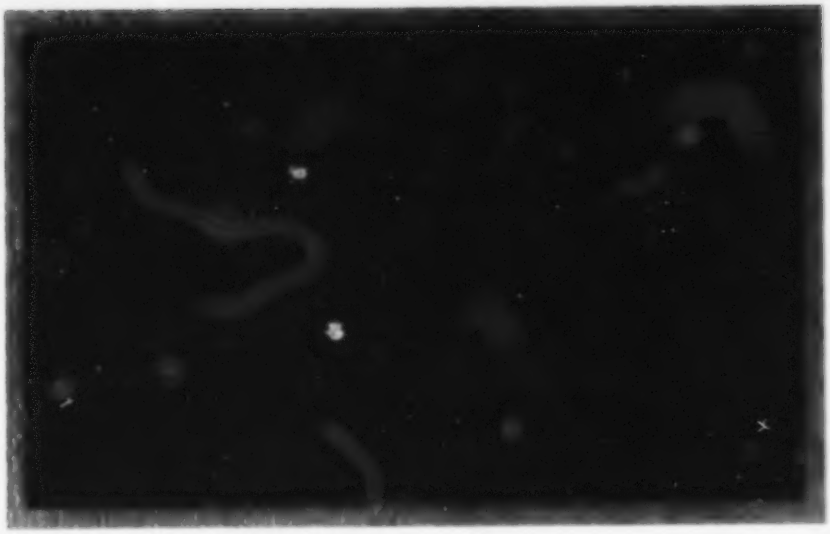

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TRANSPORT AND TERRITORIAL DEVELOPMENT IN CHINA 1949-1985

by

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ABSTRACT

This project presents the results of a study on the development of China's transport system since 1949. As part of a research program on territorial development and accessibility in China, this project is an attempt to describe its transportation system and to assess its role on territorial integration and geographic modernization. This paper explores the contradictory aspect of the concept of accessibility and demonstrates that the Chinese transport system does not solely reflect the physical conditions of a territory as an objective reality but also political ideologies which are forged to a certain extent by this reality.

Key words: Territory, planification, transport, accessibility, China

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RÉSUMÉ

Ce projet présente les résultats d'une étude sur le développement du système de transport de la Chine depuis 1949. Dans le cadre d'un programme de recherche sur le développement territorial et l'accessibilité en Chine, ce projet cherche à décrire le système de transport chinois et à évaluer son rôle sur l'intégration territorial et la modernisation géographique. Ce texte explore l'aspect contradictoire du concept d'accessibilité et démontre que le système de transport chinois ne reflète pas seulement les conditions physiques du territoire en tant que réalité objective mais les idéologies politiques qui sont forgées dans une certaine mesure pas cette réalité.

Mots-clés: Territoire, planification, transport, accessibilité, Chine

1. INTRODUCTION: Rethinking the Paradigm

In recent years, China has adopted new strategies for economic development. These strategies seek increased productivity and effectiveness in the use of resources. Spatially regions specialize in the lines of production for which they have comparative advantages. And the coastal areas are experiencing an accelerated economic growth. The policy however operates under various constraints. First, the material base for development is a finite one and resources are very unevenly distributed across the landscape. Second, this development strategy depends to a certain extent on a substantial increase in China's foreign trade. As a result important investments are conceded to the transport sector. In the present context, is this strategy optimizing the use of available resources? The answer which is tentatively accepted here as a working hypothesis rests on the contradictory aspect of the concept of accessibility. Essentially all systems of transport and their networks generate territorial contradictions; and the resolution of these contradictions points to the direction of territorial development. The present analysis will focus on the geographic environment of China as a determinating factor in the establishment of transport networks, followed by the history and performance of China's transport system within the confines of this paradigm. The objective of this paper is twofold: first, to explore the role of transportation in territorial development, and second, to understand that transport systems do not solely reflect the physical conditions of a territory as an objective reality but also political ideologies which are forged to a certain extent by this reality.

2. The Geographic Environment and the Transport System

Obviously, all society must organize the surface on which it operates (Figure 2.1). But nation-states also have to adjust to a given physical space. This is particularly true in the case of China where distances, mountains and rivers hinder the mobilization of resources for development.

2.1 Distances

Physical barriers to movement over space have to be reduced to a minimum. Indeed, the overcoming of distance is so basic to geography that development cannot occur without movement. Distance can be measured in terms of length, time and cost. But the important point to underline is that an emphasis on distance is an emphasis on extent. Indeed, the distance reached provides a record of the extent to which the nation state has shaped terrestrial space and in so doing has shaped itself. Table 2.1 provides a partial understanding of the internal transport diversity and geographic size of China. The distance factor coupled with other elements of the physical environment represent a formidable obstacle to territorial integration.

TABLE 2.1: Length of Principal Routes in China, 1983

RAIL		ROAD		AIR	
Name	Length (km)	Name	Length (km)	Name	Length (km)
Fengtai - Southern Guangzhou	2,298	Shanghai - Chengdu - Lhasa - Nyanang	4,907	Beijing - Urumqi	2,842
Western Lanzhou - Western Urumqi	1,904	Shanghai - Hefei - Lanzhou - Yining	4,095	Beijing - Kunming	2,088
Lianyungang - Western Lanzhou	1,754	Beijing - Yinchuan - Xining - Lhasa	3,863	Shanghai - Kunming	2,042
Northern Tianjin - Shanghai	1,323	Shanghai - Nanchang - Kunming - Wanting	3,689	Beijing - Guangzhou	1,966
Chengdu - Western Kunming	1,099	Xinlinhot - Zhangjiakou - Xiangfan - Hai'an	3,667	Xi'an Lhasa	1,690

Source: State Statistical Bureau 1984, comp. State Statistical Bureau, Hong Kong: Economic Information and Agency, 1984, pp. 275-276.

Figure 2.1 Administrative Divisions of China

Source: Zhonghua Renmin Gongheguo Fen Sheng Dituji. Beijing: Ditu Chubanshe, 1983.

2.2 Mountains

China's topographical outline may be likened to a four step system: the first step embodies the Qinghai-Xizang plateau. Extending over an area of 2.3 million square kilometers with an average altitude of 4,500 metres above sea level, it is the largest and highest plateau on earth; here are found the headstreams of most of China's rivers flowing eastward and southeastward. North and east of this plateau, and west of a line joining various mountain ranges is the second step. Here the terrain drops abruptly to between 2,000 and 1,000 metres or lower. It consists on the one hand of the Junggar, Turpan, Tarim and Sichuan basins, and on the other hand of the Nei-Monggol, Yunnan-Guizhou and Loess plateaus. Most of China's huge deserts and vast pasture lands are located at this level. Crossing this extensive mountain area eastward, the altitude of the land drops to an average of less than 500 metres above sea level. In this third step, relatively broad and fertile plains lying from north to south are created by the catchment area of the Heilongjiang, the Haihe, the Huanghe, the Huaihe, the Changjiang and the Zhujiang. The combination of these alluvial plains constitutes the principal farming regions as well as the most densely populated parts of China. To the east of this third step are the shallows. This fourth and last step is in fact an extension of the land into the sea. This continental shelf is essentially created by the sand and mud deposits carried here by China's rivers. Figure 2.2 illustrates the complexity of China's terrain where 65 per cent of the country's total area is made up of mountains, hills and plateaus[1]. Yet there is no integrated plan for the development of mountain regions in China. In view of this, it will come as no surprise that the density of the network is still very low compared to that of other countries (see Table 2.2).

Figure 2.2 Relief Diagram of China

Source: United States Department of Defense, Defense Mapping Agency and U.S. Naval Oceanographic Office. The World, Edition 1-DMA, Series 1150, Sheet 1 and 3,1: 14,000,000, 1982, 160X270 cm, Color

TABLE 2.2: Transport Network Density in Selected Countries, 1983

COUNTRY	DENSITY PER THOUSAND INHABITANTS				DENSITY PER THOUSAND KILOMETRES			
	Rail	Road	Water	Total	Rail	Road	Water	Total
China	0.05	0.89	0.11	1.05	5.39	95.5	11.4	112.3
India	0.08	2.29	0.03	2.40	18.67	509.5	6.0	534.2
Brazil	0.18	10.80	0.33	11.31	2.71	164.5	5.0	172.2

Source: Europa Yearbook 1985, A World Survey, 2 vols. (London: Europa Publications Limited, 1985).

2.3 Rivers

There are 370 sizeable lakes in China and more than 1,500 rivers which have a catchment area exceeding 1,000 square kilometres[2]. The rivers in China have a total length of 226,800 kilometres and a total flow of more than 260,000 million cubic metres. The largest river of China are flowing across the greatest extent of the country west to east and into the open sea. The Changjiang and its several major tributaries (conveniently flowing alternately from the south and from the north) have a navigable length of more than 70,000 kilometres which makes the Changjiang the most important water route in China. Indeed, the Huanghe and most of the waterways in North China including much of the Da Yunhe (Grand Canal) are of limited use as navigable waterways because of considerable silting and very low water during winter and spring when they are frozen for 5 to 6 months. Table 2.3 summarizes some characteristics of selected rivers in China.

China's coastline is 14,000 kilometres long stretching from the estuary of the Yalujiang in Liaoming province to the estuary of the Beilunhe in the autonomous region of Guangxi. But if the coastlines of Taiwan, Hainan and the other islands are taken into consideration, then the total length of China's coastline exceeds 20,000 kilometres[3]. From north to south China's coast is washed by the Bohai, the Huanghai, the East China and the South China seas, all of which merge with the

TABLE 2.3: Indicators of Selected Rivers in China, 1983

NAME	LENGTH (km)	CATCHMENT AREA (km^2)	ANNUAL FLOW (million m^3)
- Changjiang	6,300	1,808,500	979,300
- Huanghe	5,464	752,443	56,000
- Heilongjiang	3,101	896,756	119,200
- Zhujiang with Xijiang and Nanpan as headwaters	2,210	442,585	307,000
- Songhuajiang	1,927	545,000	75,900
- Haihe with Weihe as headwaters	1,090	264,617	28,400
- Huaihe	1,000	269,150	53,000
- Grand Canal	1,794		

Source: Statistical Yearbook of China 1984, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1984, pp. 4-5. Geography, comp. China Handbook Editorial Committee, Trans. Liangxing Liang, China Handbook Series (Beijing: Foreign Language Press, 1983), pp. 90-116.

Pacific Ocean. It must be underlined however that only the South China sea is a deep-sea basin. The others are on the shallow continental shelf. North of the Hangzhou bay, most of the coast is flat except in the Liaodong and Shandong peninsulas and in the mountainous areas between Liaoning and Hebei provinces. South of the Hangzhou Bay, the coast is mountainous except for the Hangjiang and the Zhujiang deltas, the Leizhou peninsula and the coastal area of Guangxi autonomous regions which have flat coasts. Flat coasts can provide wide possibilities of development (aquaculture, fishery, salt and offshore mining industries). While mountainous coasts are favoured with many islands and deep natural harbours. All this topographic reality about China is necessarily reflected in the development of transport within the country.

3. Transport History

Major achievements have been made by the Chinese since 1949 in developing their transport system. The objective of this historical overview is to analyze the progress in the development of China's transportation network and the extent to which transportation routes are knitting together this vast and topographically divided land.

3.1 The Period of Rehabilitation, 1949-1952

In 1949, China's transport system was marked by extreme backwardness. The new regime inherited an underdeveloped and badly damaged transportation network. At a density of 2.3 kilometres of railways, 8.4 kilometres of highways and 7.7 kilometres of inland waterways per thousand square kilometres of territory (see Table 3.1), China was less well provided with transport facilities than any other large country in the world. Besides, there was a particularly marked dichotomy between the few areas of continuous accessibility and the vast areas of limited or no accessibilty. In fact, in 1949 about 60 per cent of the total 21,800 kilometres of railways (see Table 3.1) of different gauges and types were concentrated in Northeast China and along the coast. More specifically, 53.85 per cent of the provincial capitals had no rail connections with Beijing[4]. Table 3.1 also indicates that there were only 80,768 kilometres of highways at the time of liberation in all of China. Moreover, the highway system was characterized by roads with little or no surfacing and by bridges and ferries of low capacity[5]. Clearly, they were planned not to compete with the railways but to supplement them.

Despite their historical and geographic significance, there were only 73,615 kilometres of navigable inland waterways in China in 1949

TABLE 3.1: The Development of the Transport Network in China, 1949-1983

YEAR	LENGTH (in Km) OF				LENGTH (in Km) OF		
	Railways in Operation	Highways in Operation	Waterways in Operation	TOTAL	Airways in Operation*		Pipelines in Operation
					D	I	
1949	21,800[d]	80,768[a]	73,615[a]				
1950	22,200[d]	99,600[a]	73,615[d]	11,387[a]	6,287	5,100[d]	
1951	22,300[d]	114,428[a]	73,615[d]	10,497[a]	5,397	5,100[d]	
1952	22,900[d]	126,675[a]	95,025[a]	13,123[a]	8,023	5,100[d]	
1953	23,800[d]	137,103[a]	95,025[d]	13,971[a]	8,971	5,000[d]	
1954	24,500[d]	146,138[a]	95,025[d]	15,243[a]	10,243	5,000[d]	
1955	25,600[d]	167,282[a]	99,938[a]	15,511[a]	12,911	2,600[d]	
1956	26,500[d]	226,318[a]	103,619[a]	19,082[a]	14,282	4,800[d]	
1957	26,700[d]	254,624[a]	144,101[a]	26,445[a]	22,145	4,300[d]	
1958	30,200[d]	421,800[d]	153,000[d]	32,995[a]	28,595	4,400[d]	100[d]
1959	32,300[d]	507,900[d]	163,000[d]	37,200[d]	31,900	5,300[d]	100[d]
1960	33,900[d]	510,000[d]	170,000[d]	38,100[d]	32,800	5,300[d]	100[d]
1961	34,500[d]	477,000[d]	172,000[d]	39,100[d]	34,600	4,500[d]	100[d]
1962	34,600[d]	463,500[d]	161,900[d]	35,300[d]	30,900	4,400[d]	100[d]
1963	35,000[d]	475,100[d]	157,200[d]	35,700[d]	31,300	4,400[d]	300[d]
1964	35,300[d]	479,200[d]	156,900[d]	38,500[d]	34,000	4,500[d]	300[d]
1965	36,400[d]	514,500[d]	157,700[d]	39,400[d]	34,900	4,500[d]	400[d]
1966	37,800[d]	543,600[d]	147,200[d]	35,000[d]	30,600	4,400[d]	700[d]
1967	38,600[d]	557,500[d]	147,800[d]	35,100[d]	30,700	4,400[d]	800[d]
1968	38,800[d]	571,700[d]	147,800[d]	39,400[d]	35,000	4,400[d]	900[d]
1969	39,300[d]	600,600[d]	148,100[d]	39,300[d]	34,900	4,400[d]	1,000[d]
1970	41,000[d]	636,700[d]	148,400[d]	40,600[d]	36,200	4,400[d]	1,200[d]
1971	42,800[d]	675,400[d]	141,600[d]	42,100[d]	37,700	4,400[d]	2,000[d]
1972	43,900[d]	699,900[d]	140,600[d]	42,500[d]	38,100	4,400[d]	2,300[d]
1973	44,300[d]	715,600[d]	138,800[d]	45,400[d]	41,000	4,400[d]	3,400[d]
1974	45,100[d]	737,900[d]	137,400[d]	81,300[d]	44,200	37,100[d]	4,300[d]
1975	46,000[d]	783,600[d]	135,600[d]	84,200[d]	47,100	37,100[d]	5,300[d]
1976	46,300[d]	823,400[d]	137,400[d]	97,800[d]	56,900	40,900[d]	6,300[d]
1977	47,400[d]	855,600[d]	137,400[d]	132,100[d]	91,200	40,900[d]	6,700[d]
1978	48,600[d]	890,200[d]	136,000[d]	148,900[d]	93,600	55,300[d]	8,300[d]
1979	49,800[d]	890,000[e]	136,000[e]	160,000[d]	108,700	51,300[d]	9,100[d]
1980	49,940[b]	888,250[b]	108,508[b]	191,700[d]	110,500	81,200[d]	8,600[d]
1981	50,181[b]	897,462[b]	108,665[b]	218,200[d]	134,400	82,800[d]	9,731[f]
1982	50,541[c]	906,963[c]	108,634[c]	232,700[d]	132,800	99,900[d]	10,400[d]
1983	51,604[d]	915,079[d]	108,904[d]	229,100[d]	129,200	99,900[d]	10,900[d]
1984							
1985							
1986							
1987							
1988							
1989							
1990							

* unduplicated routes D = Domestic Routes I = International Routes

Sources:

a Ten Great Years Statistics of the Economic and Cultural Achievements of the People's Republic of China, comp. State Statistical Bureau (Beijing: Foreign Languages Press, 1960), p. 144.

b Statistical Yearbook of China 1981, comp. State Statistical Bureau (Hong Kong:

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d Statistical Yearbook of China 1984, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1984), pp. 273-274.
e Zhongguo Baike Nianjian 1980 (Beijing: Zhongguo Da Baike Quanshu Chubanshe, 1980), pp. 366-367.
f Zhongguo Jingji Nianjian (1981) [Annual Economic Report of China (1981)] (Beijing: Jingji Guanli Zazeshe, 1981), p. VI-18.

(see Table 3.1). Besides, many rivers were still in their natural states with a depth of less than one metre. Finally, with wartime damage, very few port facilities were available[6].

Following the war between the Nationalists and the Communists, aviation in China was in a complete state of disarray. Many of the existing airfields, airports, aircrafts and navigational aids were either damaged or destroyed. The airlines had virtually ceased operations as only 17 transport planes were operational. Besides, there was little maintenance equipment and few spare parts for their reconditioning. Aviation fuel was also extremely scarce[7].

The transportation network in China is the result of long historical development where the area of greatest transportational accessibility became the core area. The accessibility of this early core area was further reinforced by the colonial establishment of trading ports. Since the purpose of a substantial part of the transportation network was to meet colonial needs and goals, it is hardly surprising that the resulting network was not geared to national needs of spatial integration which would have linked together the developed areas and opened up fully the potential of the back country. Therefore, between 1950-1952, reconstruction of much of the old network was undertaken and plans were formulated for the extension and improvement of the transportation network.

3.2 The First Five-Year Plan, 1953-1957

In order to connect the four corners of a country as vast as China with modern means of transport, the need for a plan for its systematic development cannot be overemphasized. In a broad sense, transport policy and planning includes: (1) determining the volume and composition of future traffic, (2) elaborating measures in order to distribute traffic among the various transport modes in a way that minimizes total costs, (3) formulating guidelines for future development, (4) establishing regulations for proposed investments and (5) developing mechanisms to ensure that plans are carried out in a manner consistent with policy objectives.

During the First Five-Year Plan, the Chinese made strenuous efforts to introduce and expand a rational system of transport for such important materials as coal, grain and timber. As such, a sum of 8,210 million yuan was invested in capital construction for the transport, postal and telecommunication services[8]. Of this amount 69 per cent was used for railway construction. Railways were thus recognized as the key sector of national transport. Moreover, most of the investments were used first to build new railway lines, followed by the improvement and reconstruction of existing railways. During this period, new routes were built in mining districts and forest areas[9]. At the same time, important lines were constructed in the Northwest and the Southwest. Better connections with major trading ports of South China were also provided with the Yingtan-Xiamen line and the Litang-Zhanjiang line. It is important to underline however that the speed of construction was impeded in certain regions by the presence of minority nationalities, some of whom were hostile to the building of railways on their land. As such, the new regime could get little, if at all, labour power,

financial aid or material support from the local peoples[10]. Nevertheless, as Table 3.1 indicates, at the end of the period 4,700 kilometres had been reconstructed, bringing the total length of railways in operation to 26,500 kilometres in 1957.

In this five-year period, the main effort in highway building was concentrated in minority nationalities areas in Southwest China, in the border areas and along the coast. Far more identified new highways were built in the less developed regions than in the developed ones[11]. Two factors of significance are worth noting with regard to highway construction during that period. First, the Chinese indicated quite early that the transport sector was essentially the servant of heavy industry[12]. As such, they found it very difficult to invest large sums of money in local transport enterprises to buy modern transportation equipment to ameliorate the existing traffic congestion in various localitites. Therefore, they relied on the mobilization of local authorities, communes and peasants themselves to repair, maintain and build roads through self-reliance[13]. Second, most of the new roads were situated in Northwest or Southwest China where the terrain is mountainous and transportation conditions are most difficult. Thus some of the new roads such as the Qinghai-Xizang, Xinjiang-Xizang and Sichuan-Xizang highways are major engineering achievements, crossing terrain of over 4,000 metres above the sea level. Notwithstanding, as Table 3.1 indicates, the total length of highways in operation of 254,624 kilometres in 1957 was twice that of 1952.

With regard to water transport, the main emphasis on dredging and renovation of navigation routes was put on river transport with the Changjiang as the key artery, followed by the southern and northern

sections of the Da Yunhe (Grand Canal). The importance of the Changjiang arises from three major considerations: (1) to move grain from Sichuan province, (2) to increase the exchange of goods between the Southwest and other parts of China, and (3) to transport coal and other important commodities on the middle and lower reaches of the river. Since the great rivers flow from west to east, they fail to provide direct links between North and South China. Coastal shipping could have provided such a link, but, for a variety of reasons already noted, was not given a priority commensurate with its potential until very recently[14]. In terms of route length of navigable inland waterways, the system in 1957 measured 144,101 kilometres (see Table 3.1).

During the First Five-Year Plan period, civil aviation was given the task of strengthening the links between Beijing and important cities in the provinces as well as with the remote and border regions. Simultaneously, special aerial services were organized to meet the needs of agriculture, forestry and geological survey[15]. In these five years, 13,322 kilometres of airways were put into operation. The total length of domestic routes was 22,145 kilometres while international routes amounted 4,300 kilometres, accounting respectively for 83.7 per cent and 16.3 per cent of the total (see Table 3.1). Moreover, as shown in Table 3.2, in 1957 there were 29 air routes serving 38 cities.

During the First Five-Year Plan, China's transportation construction was undertaken to attain the following aims: firstly, to disperse the industrial base in order to promote regional economic development. Secondly, to improve the defense support system. Indeed, since the Chinese have been preoccupied with the defense of their frontier regions, the development of routes thus provided access to sensitive and strategic areas and ensured the quick movement of military

TABLE 3.2: The Selected Indicators of Civil Aviation in China, 1949-1981

YEAR	AIR ROUTES			CITIES SERVED	FOREIGN AIRLINES
	Total	Domestic	International		
1949					
1950				5[l]	1[l]
1951				9[l]	
1952	10[c]			13[c]	
1953					
1954					
1955	14[ab]	11[a]	3[ab]	20[a]	
1956	21[b]	18[b]	4[b]	31[b]	
1957	29[c]			38[c]	
1958					
1959					
1960					
1961		33[d]			
1962					
1963	40[d]	34[d]	6[d]	47[d]	
1964	51[e]	43[e]	8[e]	49[e]	3[l]
1965	54[f]	46[f]	8[f]		4[l]
1966	58[g]	49[g]	9[g]	70[g]	5[l]
1967	58[hm]	50[h]	8[hm]		4[l]
1968					5[l]
1969					
1970					
1971	83[i]	75[i]	8[i]		4[i]
1972					
1973	89[jo]	80[j]	9[o]		4[r]
1974		85[k]			
1975					
1976					9[s]
1977					
1978	156[n]	144[n]	12[n]		
1979	173[n]	158[n]	15[n]		
1980	175[pq]	159[q]	16[p]	79[q]	
1981			18[q]		15[q]

Sources:

a Shang-wen Chao, "Communications and Transportation," in Communist China 1955, Communist China Problem Research Series, no. EC 15 (Hong Kong: Union Research Institute, 1956), p. 69.

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p Qing Tian, ed., China Official Annual Report 1981/2 (Hong Kong: Hong Kong Kingsway International Publications Limited, 1981), pp. 481-482.

q Qing Tian, ed., China Official Annual Report 1982/3 (Hong Kong: Hong Kong Kingsway International Publications Limited, 1982), pp. 521-522.

r "Peking Control: Are We Clear to Land?" China Trade Report, vol. 11, no. 11 (December 1973), p.4.

s "Aviation," China Trade Report, vol. 15 (February 1977), p.3.

supplies and personnel. Thirdly, to reduce regional disparities within the country by reaching out to areas populated by minority nationalities. Fourthly, to facilitate the central government control over the entire country[16]. However, although transportation construction had been accelerated and some developments achieved, transport capacity was still very much limited.

3.2 The Second Five-Year Plan, 1958-1962

It is extrememly difficult to assess the planned goals of the Second Five-Year Plan since details concerning transport development were never spelt out[17]. Nevertheless, several points can be raised with regard to the planned period. The most important influence on transportation was the Great Leap Forward Movement. More specifically, under the guidance of the "walking on two legs" policy, the Chinese

utilized both the resources of the central government and the resources of the local governments, the power of the state and the power of the masses, advanced means of transport and traditional means of transport[18]. Everyone was called upon to maximize transport facilities, and to intensify transport construction[19]. But, in its pursuit of quantity in the development of transportation, the Chinese government overlooked the qualitative aspect of transport construction. In fact, the Great Leap Forward Movement put great strain on transport facilities and as such failed to solve the problems of the transportation system[20]. Hence, in the early nineteen-sixties, the Chinese adopted a policy of consolidation, reinforcement and improvement in transport undertakings. More, specifically, policy shifted and increased attention was given to agriculture[21]. Besides, the authorities launched a national movement in order to stimulate all positive factors to develop short-distance transport[22]. As such three tasks were elaborated. Firstly, to strengthen the management over the transport teams. Secondly, to maintain and repair the available transport capacity and improve the technical conditions of the means of transport. Thirdly, to organize relay transport. Following this, short-distance transport became the real pivotal link between the urban and rural areas mutually benefiting both industry and agriculture in the production and circulation of commodities.

Railway transport was extremely tense during the period under review in fulfilling its assignments. For not only did railways have to ensure the supply of coal, notably over long distance, but materials in support of agriculture were to enjoy priority as well. Since railway transport facilities were far from sufficient to meet the demand, traffic confusion and congestion were rampant[23]. The Chinese did make

some progress in railway construction however, namely in the Northwest with the completion of the Lanzhou-Urumqi line. Other lines were also constructed along the coast and in the southwestern provinces. In 1962, the system had a total route length in operation of 34,600 kilometres (see Table 3.1).

With regard to highway transport, the speed of construction was unprecedented. Table 3.1 indicates that in 1959 the total length of highways in operation of 507,900 kilometres was almost twice the length of 1957. But the quality and condition of roads were still relatively low. Indeed, many highways had numerous bottlenecks such as sharp turns, steep slopes and narrow passes, and about half of the roads had to be closed to traffic on rainy days[24]. Consequently, after the Great Leap Forward Movement, highway construction was abruptly curtailed. The principal tasks then undertaken by the Chinese were: (1) to maintain existing roads first before building new ones, and (2) to transfer road transport enterprises in the rural and mountainous regions. Indeed, there was a particularly serious problem in certain rural areas where grain could not be transported due to the critical shortage of highway transport facilities. During the same period however, it is important to underline that the Chinese have constructed all-weather roads in areas of strategic importance such as along the coast and near the borders of Viet Nam, Lao, and Burma in Yunnan and Guizhou provinces in order to facilitate the interflow of goods, notably military supplies and construction materials, with Southeast Asian countries[25].

At a time when there was great strain on railway and highway transport, the increase of waterway transport capacity lessened the volume of land transport. The Chinese spared no effort in strengthening

waterway transport in order to insure the quick loading and unloading of grain and other agricultural produce along rivers in rural areas. Irrigation channels and reservoirs were also used for transport purposes. The two purposes however often contradicted each other and one had to be sacrificed on account of the other[26]. In inland waterway construction, an emphasis was placed on the restoration of the navigable waterways along the medium-sized and small rivers. As a result in 1961 China had 172,000 kilometres of navigable waterways (see Table 3.1), the highest figure recorded since 1949.

Throughout the period of the Second Five-Year Plan, there was little progress in airway transport. As in other branches of the transport system, the central task was aid to agriculture. The work undertaken by the civil air transport included: (1) the annihilation of insects in agricultural crops and forests, (2) fire prevention and forestry maintenance, (3) seeding, (4) spraying of fertilizer and artificial rain, and (5) long distance transport of good breeds of livestock[27].

3.4 The Great Proletarian Cultural Revolution and the Third Five-Year Plan, 1966-1970

In early 1963, local communication and transportation departments were urged to continue strengthening short-distance transportation in xian (county) and xiang (village) in the service of agriculture[28]. The development of rural, short-distance transportation facilities was followed until the end of 1963. From policy statements and speeches in 1964 however, the emphasis on transportation developmemt began to change[29]. The Chinese authorities realized that rural short-distance transportation, although highly effective, was placing a heavy drain on rural labour power. Indeed, traditional means of transport such as hand

barrows, animal drawn carts and junks continued to handle the greatest loads of goods. As a result, the official policy stressed readjustment instead of raising the standard of existing facilities.

With the outbreak of the Great Proletarian Cultural Revolution, the whole national economy was thrown into disarray. Hence little was accomplished in capital construction in the field of transportation. Besides, transport departments had the task of carrying millions of Red Guards from various places of the country to Beijing under the pretext of exchanging revolutionary experiences. These extensive travels brought serious dislocation of normal traffic and gave rise to problems in supplying industry with raw materials for production. The situation eased somewhat towards the end of 1969 and several measures were adopted to reestablish the transport system: (1) simpler administration by amalgamation, (2) technical innovations such as containerization, (3) the launching of mass movement for quick loading, quick unloading and quick shipment and (4) the continued undertaking of capital construction[30].

Although the transport construction policy emphasized support of short-distance transport in rural areas, limited financial resources discouraged the Chinese government from embarking on large-scale railway building that involved enormous investment and complicated techniques. Besides, railways are primarily engaged in transporting heavy industry and military supplies over long distances while agricultural produce are mostly scattered commodities that require short-distance transport. Despite the widespread disruption brought about by the Great Proletarian Cultural Revolution, the Chinese continued to carry out railway construction projects. The year 1968 witnessed the completion and opening to traffic of the Changjiang bridge at Nanjing. This was truly

a great event in the history of China's railway bridge construction for it required considerable engineering skill[31]. Moreover, the Chinese authorities paid great attention to the distribution of railway networks and the construction in hitherto neglected areas. As a result, by the end of the Third Five-Year Plan, all railways lines in mainland China were for the first time in history integrated into a single system[32]. With the exception of Xizang, all municipalities, provinces and autonomous regions had access to the system. In 1970, the total length of railways in operation was 41,000 kilometres (see Table 3.1).

Unlike the railways, highway transportation has the advantages of flexibility and penetration. Therefore, under the call of giving support to agriculture, highway transportation played its role to the best advantage. Besides, the delivery of agricultural produce depends more on highways than on railways. During the period under review, highway construction was generally limited to the building of rural roads between communes and in mountainous areas. Strategic roads were also built in the frontier regions, notably in Xinjiang, both to facilitate the exploitation of resources and to improve the defense support system. Indeed, all nuclear tests have reportedly been carried out in that area. Furthermore, steadily deteriorating relations between China and the Soviet Union inevitably aggravated the existing tensions on the frontier regions. With the exception of the remote border regions, low standard and poor quality in road building continued to exist. Highway transportation was seriously affected by the Great Proletarian Cultural Revolution and the peasants had to contribute their time, efforts and money to build and repair roads, thus curtailing agricultural production[33]. As Table 3.1 indicates, in 1970 there was

only 636,400 kilometres of highways in China, a length which is far from being adequate to meet the demands of a developing national economy.

Although the total length of waterways in operation decreased during this period, waterways suffered a lesser degree of disruption from the Great Proletarian Cultural Revolution than did the railways and the highways. Some problems however did occur on the main rivers and at several major ports along the coast[34]. With the Third Five-Year Plan, the Chinese paid utmost attention to the restoration of transport order and the construction of infrastructure in the various coastal ports especially Shanghai because of the important bearing they have on foreign trade[35]. With regard to inland river ports, the Chinese placed emphasis upon the improvement and construction of port facilities along the Changjiang in order to facilitate joint water and land transport as well as joint river and sea transport. The attention paid to water transport stemmed from two reasons: (1) it required less cost and labour power than other modes of transport and (2) it was a suitable means of transport for carrying large volumes of freight.

The development of airways slowed down considerably in the period under review. This was caused by insufficient funds and because air cargo was limited and very costly. With the exception of high ranking cadres and foreign visitors, common people very seldom travel by air. In the initial stage of the Great Proletarian Cultural Revolution, civil aviation was put under military control[36]. Therefore, normal services on most of the routes were maintained. At a time when land and water transport were seriously disrupted, civil aviation undertook the transportation of important supplies, such as scientific instruments, tools, apparatus and materials needed by industry. Meanwhile, airways also played an important role in giving support to agricultural

production. Furthermore, with the increasing number of domestic lines (see Table 3.2), notably in the Northeast, Northwest and Southwest, and by the expansion of two major airports (Shanghai and Guangzhou), the Chinese authorities were fulfilling three objectives: (1) to strengthen the links with the frontiers, (2) to speed the international services and (3) to shorten the flying time for those flights starting from Beijing[37].

3.5 The Fourth Five-Year Plan, 1971-1975

During this Fourth Five-Year Plan, the Chinese have made certain achievements with regard to the development of the transport system, due principally to: (1) technical innovation of the means of transportation and (2) the " joint transport " policy. " Joint transport " is a system in which the popular means of transport are fully utilized to coordinate with the state-owned means of transport. The Chinese realized that integrated transportation services are necessary when there is no direct connection between points of departure and arrival or when integrated services are more advantageous than a single type of transport[38]. Moreover, " joint transport " raises the efficiency of transport and simplifies the procedures of trans-shipment. However, this policy tends also to improve the means of transportation in the direction of the already existing market, that is to say, towards the great centres of production and population, and towards the ports of exports.

During this period, more attention was paid to building and repairing railways in the frontier regions of Northwest and Southwest China. Major decisions were also made with regard to electrification, especially of lines over difficult terrain[39]. Electrification increases rail line capacity and efficiency. In terms of total length of railways

in operation, the system in 1975 measured 46,400 kilometres, an increase of 5,000 kilometres over 1970 (see Table 3.1).

In highway construction, stress was laid on two aspects: (1) building local and mountain highways, and (2) strengthening the highway network in the western and southern border areas[40]. Moreover, the Chinese relied on the strength of the localities, communes and brigades to undertake road construction through self-reliance. Table 3.1 indicates that 146,900 kilometres of new routes were added to the system which at the end of the period had a total route of 783,600 kilometres.

Meanwhile, the Chinese have continued to improve and increase the facilities of their inland and coastal ports and harbors[41]. The collected data however seem to indicate that during the Fourth Five-Year Plan, the length of total inland waterways in operation declined by 12,800 kilometres since 1970 to reach 135,600 kilometres in 1975 (see Table 3.1). This was the result of new dams for irrigation, flood control and hydro-electric projects that were constructed during the period under review. But it must be added that the carrying capacity of some inland waterways has been improved, notably the Changjiang[42].

Although China's airways were providing a number of specialized services, their contribution to the total transport sector remained minor. As Table 3.1 indicates, the total length of airways in operation was 84,200 kilometres in 1975. Domestic routes covered 47,100 kilometres while international routes traversed 37,100 kilometres. In keeping pace with the country's expansion of foreign trade and tourist industry, the Chinese authorities have opened new international routes during the Fourth Five-Year Plan.

The Chinese realized the importance of petroleum both to national defense and to the economy notably modern industry and mechanized

farming. But, inadequate transport facilities between the remote oil fields and the main centres of population and industry caused major bottlenecks[43]. China had a few kilometres of pipelines in operation as early as the 1950's. And yet only during the fourth five-year plan did the Chinese authorities undertake a massive programme of pipeline construction. In 1975, the total length of pipelines in operation was 5,300 kilometres (see Table 3.1).

3.6 The Fifth Five-Year Plan, 1976-1980

During the Fifth Five-Year Plan, the Chinese gave priority to selected transport projects as they followed their four point policy of readjusting, restructuring, consolidating and improving. Transport facilities related to energy production, foreign trade and tourist industry received the greatest emphasis.

With regard to railways, construction centered on improving connections to agricultural, industrial, commercial and mineral resources areas of concentration[44]. More specifically, extensive work was started on unlocking the resources in the strategic areas of the western provinces and autonomous regions. Construction included the first stage of a line linking Xining in Qinghai province to Lhasa in the Xizang autonomous region. By 1980, 835 kilometres were completed on the northern portion, from Xining to Golmud. Priorities have also been given on the upgrading of old lines in North and East China. At the end of 1980 the total length of railways in operation was 49,940 kilometres (see Table 3.1).

Under the planned period, construction emphasis shifted to improving the quality of existing roads, especially access routes to industrialized coastal cities. The Chinese realized that due to the

inadequacy of the urban highway network, the rail and water system were actually carrying a considerable volume of short-haul freight that could be better carried on roads[45]. Table 3.1 indicates that 104,650 kilometres of new routes were added to the system since 1975. Thus the total length of highways in operation in 1980 was 888,250 kilometres.

With regard to navigable inland waterways, for a variety of reasons already noted, the network had shrunk to 108,508 kilometres by 1980 (see Table 3.1). Noticeable improvements however have been made in the overall mechanization of Chinese ports. Containerization has been further developed. The Chinese also undertook an impressive development of their ocean-going fleet. The intended purpose was to eliminate China's dependence on chartered foreign vessels[46].

The total length of international and domestic airways totaled 191,700 kilometres in 1980 (see Table 3.1). Within China, 159 domestic routes covered 110,500 kilometres and served 79 cities. Outside China, 16 international routes covered 81,200 kilometres (see Table 3.2).

Pipeline construction has been directed at eliminating transportation bottlenecks that have long hampered energy transfer in China. Most of the oil pipelines are providing direct links from oilfield to refinery or from oilfield to port, thus reducing the need for rail shipments. In 1980, there was 8,660 kilometres of pipelines in China (see Table 3.1).

3.7 The Sixth Five-Year Plan, 1981-1985

The Sixth Five-Year Plan period was one of transition in China's economic development strategy. The Chinese considered that the dynamic development of their territory necessitated a shift in emphasis towards the coastal areas. As a result, much construction occurred in the eastern regions by setting up special economic zones and opening cities

and areas to the outside world. The Sixth Five-Year Plan stated that 13.4 percent of the entire capital investment for the plan would serve to finance the communication and transport sectors[47]. During the period under review, improvement of the transport sector was concentrated in the coastal regions especially the coastal ports for imports and exports. Another objective was to increase the capacity for the transport of coal. Indeed, since both funds and materials were limited, railway investment has been reduced and the emphasis shifted away from the new line construction to capacity increases on existing lines, particularly in the coal mining areas of Shaanxi, Nei Monggol and Hebei[48]. The Chinese authorities have therefore increased the role of short-haul road transport since it represents a quicker, lower cost alternative to rail improvement in some areas, and relieves some pressure on the transport system. During the planned period, the Chinese have completed a network of trunk roads linking the following major parts: Luda, Tianjin, Xingang, Shanghai and Huangpu (Guangzhou). Renovations have also been undertaken on various bridges and ferries, as well as on certain main arteries. It must be remembered that of all existing highways, 42.1 per cent are not up to standard[49]. Moreover, millions of people still do not have access to the road network, especially in the mountainous regions. Therefore, China still faces major difficulties in highway construction. Indeed, the Chinese authorities have accepted to build a highway network with foreign technology and in joint venture. This was confirmed in January 1982 when Hopewell Holdings announced that it will build a road linking Shenzhen-Guangzhou-Zhuhai[50]. The highway should be completed by 1990. The last of the four bridges on the highway linking Guangzhou with

Zhuhai was opened to traffic in November 1984[51]. With regard to water transport, emphasis during the planned period was put on the development of container technology and deep-water berths[52]. While civil aviation gave importance to the circulation of tourists.

4. Transport Performance

It is believed that the search for greater accessibility leads ultimately to higher levels of geographic modernization. It should be emphasized that it is extremely difficult to compare the relative degree of geographic modernization of municipalities, provinces and autonomous regions in China on the basis of their spatial interactions because that vary so much in their orientation to rail, road and water modes of transport. For instance, within Ningxia, almost all transportation takes place by rail whereas in Xizang, the very mountainous topography dictates the exclusive use of highway transport. In parts of Zhejiang, river transportation is vital.

Recent issues concerning the transport system in China relate to (1) the extension of its network, (2) the traffic capacity and (3) the composition of its fleet[53].

4.1 The Extension of the Network

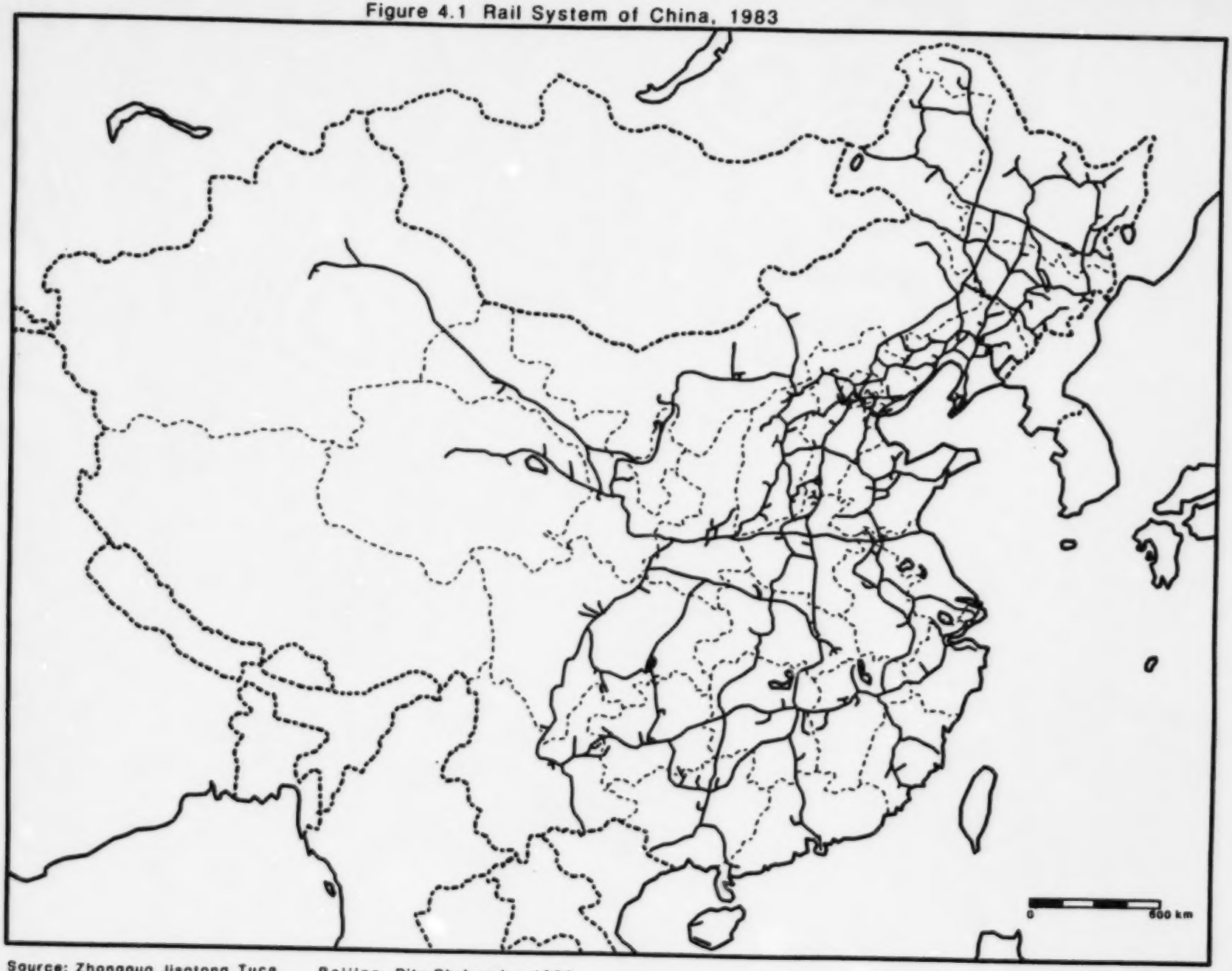
Based on recently available data, Table 3.1 shows that the length of railways in operation has grown fromn 21,800 kilometres in 1949 to 51,604 kilometres in 1983, or at an average growth rate of 2.6 per cent per annum. When the People's Republic was established, China's railways were heavily concentrated in the coastal regions. The Chinese railways Gini coefficient of 0.3914 in 1983 as compared to 0.6134 in 1949 (see Table 4.1), indicates that major efforts have been made to extend railways throughout the country and especially in the interior. In the nineteen-seventies a shift has taken place in rail construction policy, from new line construction in the hinterland to the renovation and expansion of existing lines in the coastal areas[54]. Since the nineteenth-eighties however, evidence appears to demonstrate that China has adopted a dynamic approach regarding the planning of her territory,

shifting periodically from coastal to hinterland provinces in rail development. Nevertheless railway density still highlights the contrast between the coastal area and the hinterland (see Table 4.2). There is a rail transport corridor which extends roughly from the city of Harbin in the province of Heilongjiang down to the city of Guangzhou in Guangdong province (see Figure 4.1).

The total length of highways in operation in China has increased from 80,768 kilometres in 1949 to 915,079 kilometres in 1983 -- a 7.4 per cent increase per annum (see Table 3.1). But Figure 4.2 illustrates the sharp contrast in road density that still exists between the coastal regions and the hinterland.

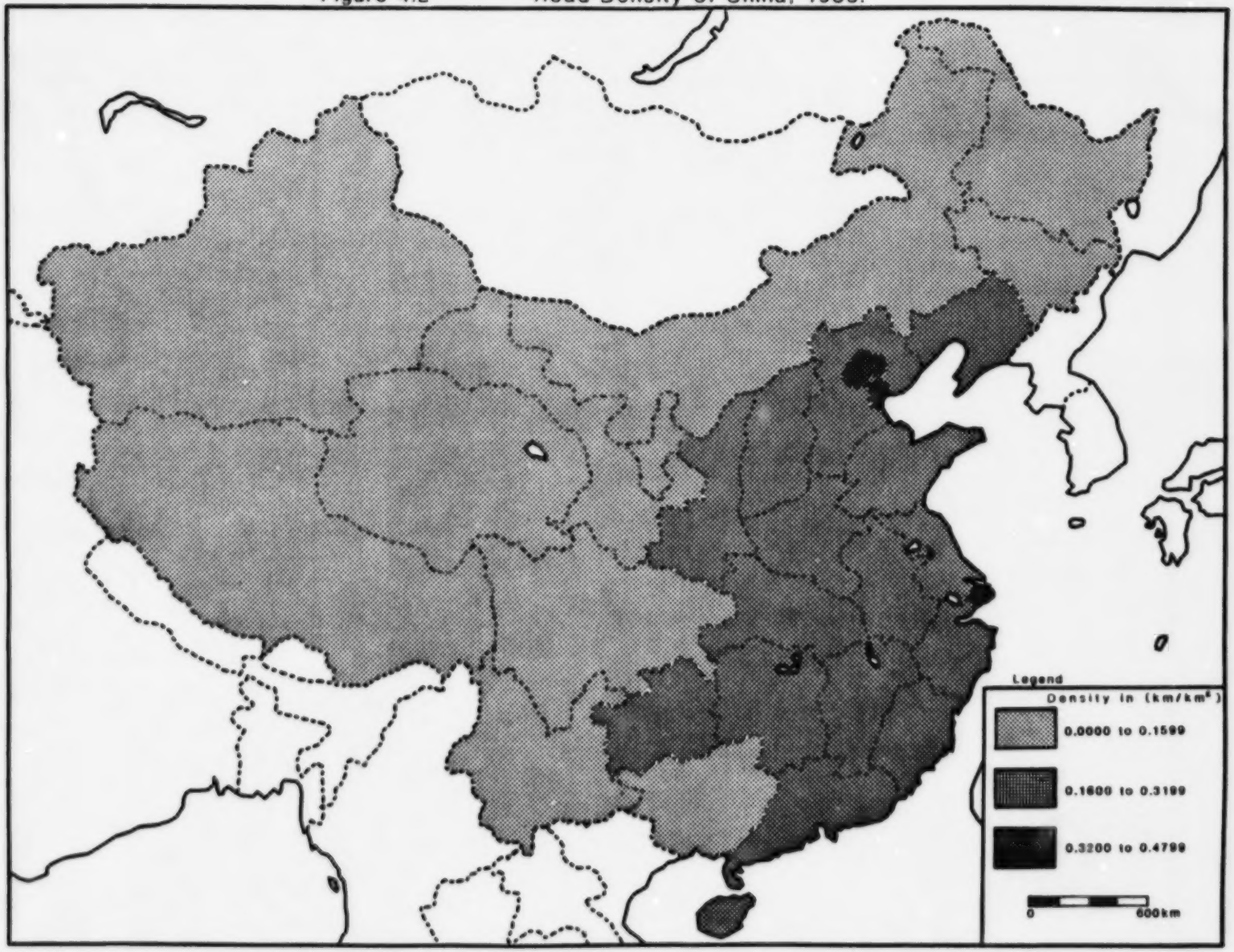
In 1983, the length of inland waterways in operation totalled 108,904 kilometres (see Table 3.1). Actually, during the past decades the inland waterways somewhat fell into disuse with the advent of rail transport. Besides, only 54,922 kilometres have a depth of one metre or more[55]. Most rivers are still in their natural state, with few port facilities. Therefore the rapid growth in traffic is putting a considerable burden on Chinese ports. Evidence also shows that the recent growth in the major ocean ports reflects the economic opening if China to foreign trade (see Figure 4.3). Figure 4.4 indicates the extent of the domestic air routes in China and the importance of selected crossroads cities within the country.

Figure 4.1 Rail System of China, 1983



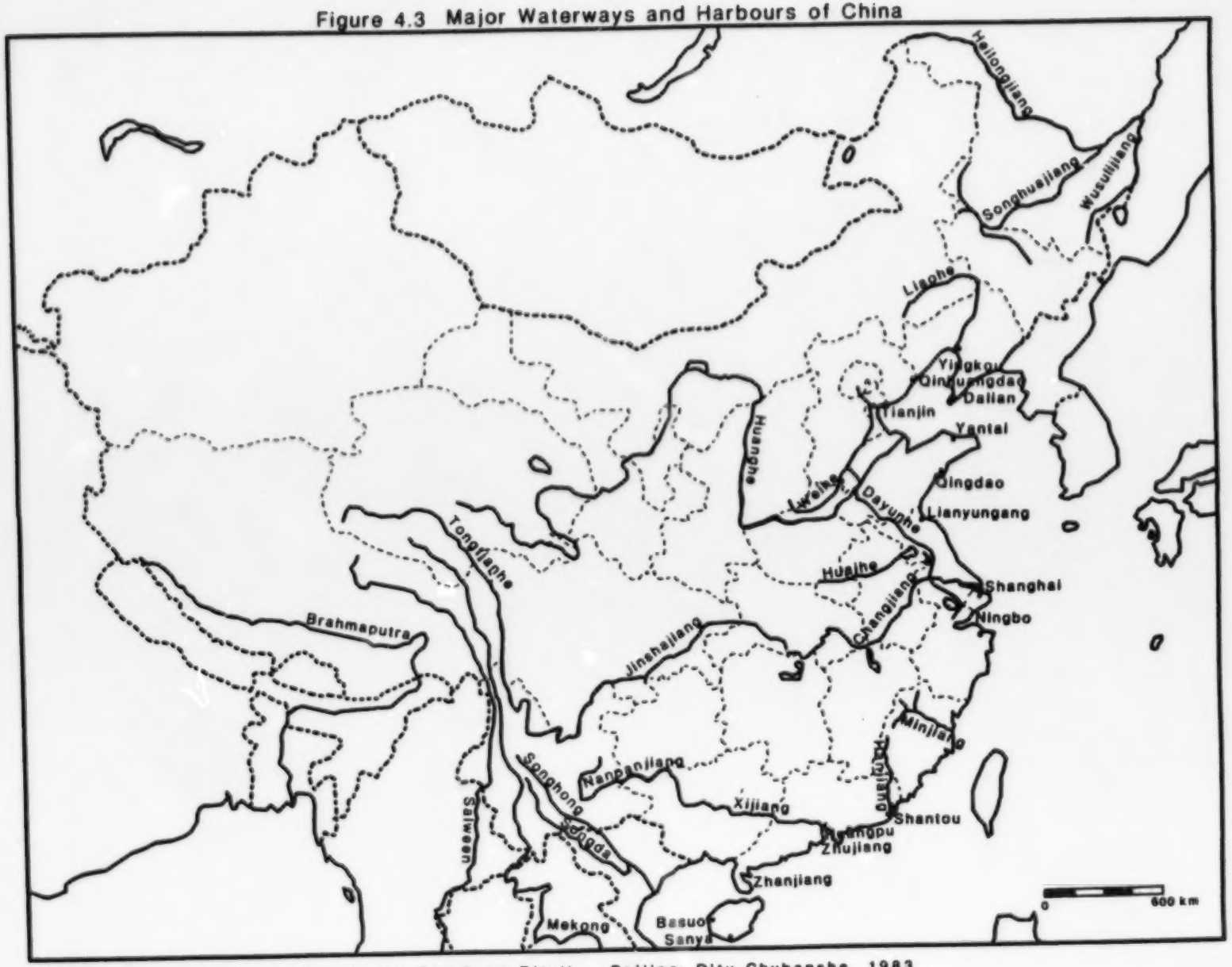
Source: Zhongguo Jiaotong Tuce. Beijing: Ditu Chubanshe, 1983.

Figure 4.2 Road Density of China, 1983.



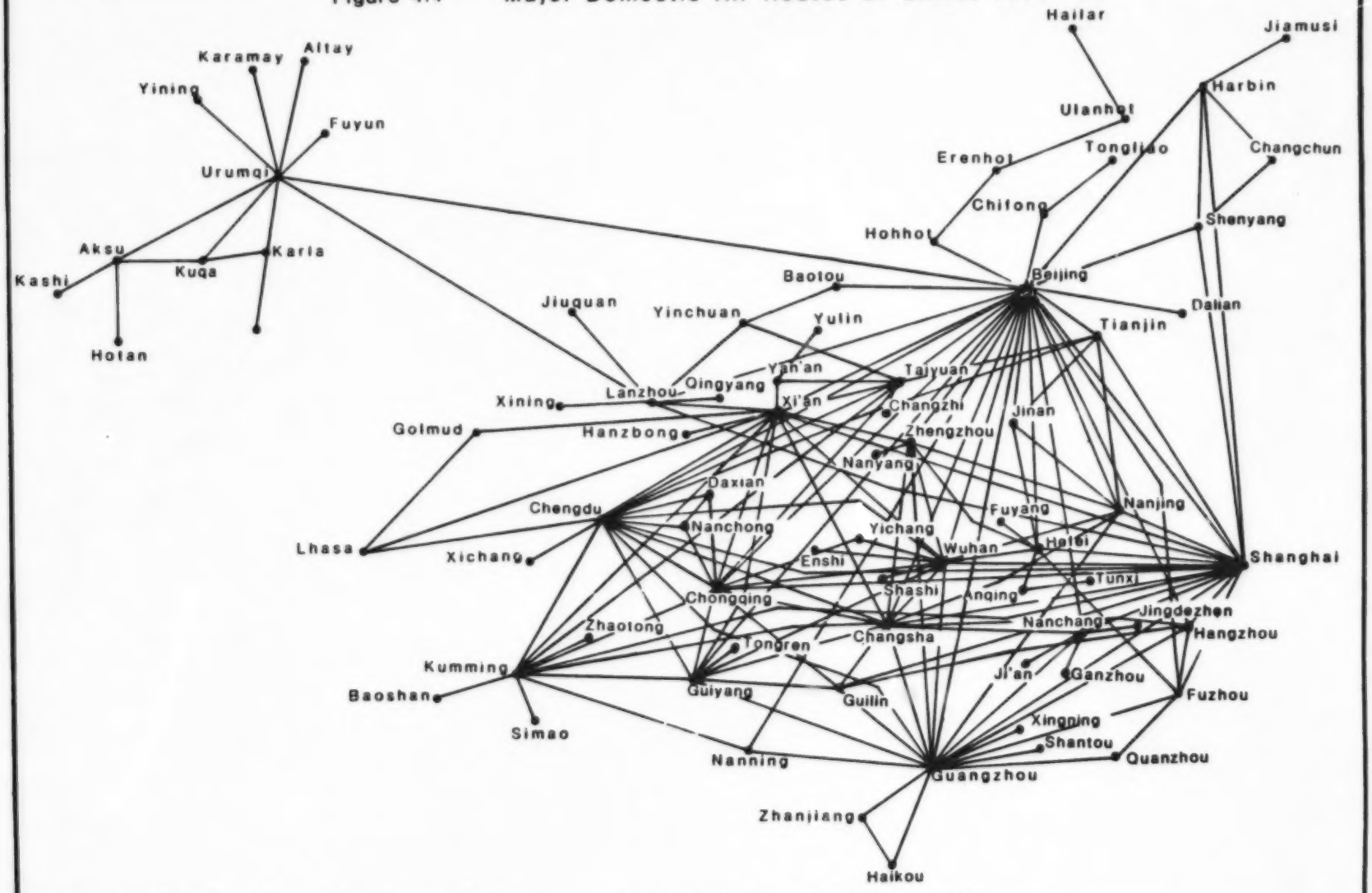
Source: Statistical Yearbook of China, 1984. Hong Kong: Economic Information and Agency, 1984.

Figure 4.3 Major Waterways and Harbours of China



Source: Zhonghua Renmin Gongheguo Fensheng Dituji. Beijing: Ditu Chubanshe, 1983

Figure 4.4 Major Domestic Air Routes of China, 1983



Source: Quanguo Jiaotong Yingyun Xianlu Licheng Shiyitu. Beijing: Renmin Yingyun Chubanshe, 1982.

TABLE 4.1: Railways Distribution in China, 1949-1983

YEAR	GINI COEFFICIENT
1949	0.6134
1952	0.5594
1957	0.4693
1963	0.4248
1970	0.3864
1975	0.3918
1981	0.3889
1982	0.3910
1983	0.3814

Sources: Calculated with figures for length of railways in Chi-keung Leung, China: Railway Patterns and National Goals, Department of Geography Research Papers, no. 195 (Chicago: University of Chicago, 1980), pp. 176-194; Statistical Yearbook of China 1981, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1982), p. 274, Statistical Yearbook of China 1983, p. 300, Statistical Yearbook of China 1984, p. 274.

Note: The Gini coefficient is a statistic which measures the degree of spatial concentration. In the present analysis a value of zero would indicate that the percentage of railways in each municiplaity, province and autonomous region is equalled to the percentage of the total national area occupied by each municipality, province and autonomous region. Whereas a value of one would indicate that all railways are concentrated in one municipality, province or autonomous region.

4.2 The Traffic Capacity

Freight traffic in China has grown from 160,970 thousand tons in 1949 to 2,545,520 thousand tons in 1983, or an average growth rate of 8.5 per cent per annum[56]. During the same period the total ton-kilometre ratio has increased from 25,500 million to 1,329,500 million -- a 12.3 per cent per annum increase[57]. These figures mean that while China's transport system has experienced remarkable development since the nineteen-fifties, more expansion in fact has been experienced in the volume of freight traffic, as a result of the development of the long distance and more specialized modes such as ocean-going freight, pipelines and civil aviation transport, particularly since 1970. Parallel to freight transport, expansion in the passenger transport sector was very important. Given the fact that China's ocean transport consists practically only of freight and her civil aviation, which is

TABLE 4.2: Rail Transport in China's Provinces, 1983

PROVINCES	RAILWAY DENSITY (Km/Km^2)	FREIGHT DENSITY (Million Ton - Km/Km)	FREIGHT TRAFFIC Per Capita (Ton/Pop.)
Beijing	0.0512	18.1	3.4
Tianjin	0.0352	40.4	2.4
Shanghai	0.0401	13.5	1.1
Liaoning	0.0242	20.0	3.7
Henan	0.0118	31.4	0.9
Jilin	0.0193	8.8	2.3
Hebei	0.0144	31.4	1.8
Shanxi	0.0140	11.6	5.4
Shandong	0.0111	18.5	0.7
Hunan	0.0110	12.8	0.7
Anhui	0.0154	17.2	0.8
Heilongjiang	0.0108	9.7	3.2
Shaanxi	0.0093	9.8	0.9
Fujian	0.0086	5.9	0.5
Guangxi	0.0072	9.1	0.4
Hubei	0.0089	15.8	0.7
Zhejiang	0.0083	14.8	0.4
Jiangxi	0.0086	8.9	0.6
Guizhou	0.0082	7.5	0.6
Jiangsu	0.0071	29.0	0.6
Ningxia	0.0071	10.5	3.2
Guangdong	0.0040	10.6	0.5
Sichuan	0.0050	7.5	0.5
Gansu	0.0049	9.3	1.1
Yunnan	0.0042	3.3	0.5
Nei Monggol	0.0040	6.9	2.4
Qinghai	0.0015	0.7	0.7
Xinjiang	0.0008	4.8	0.8
Xizang	0.0000	0.0	0.0
MEAN	**0.0123**	**13.4**	**1.4**
STANDARD DEVIATION	**0.0116**	**9.4**	**1.3**

Source: Calculated with figures for length of railways, freight volume, freight traffic and total population in Statistical Yearbook of China 1984, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1983), p. 84, 274, 284, 287.

itself an insignificant sector, is yet only marginally available to domestic travellers, the average rate of growth in passenger traffic at around 11 per cent per annum, which is higher than that of freight traffic (8.5 per cent), indicates probably a shifting emphasis of the domestic system towards passenger transport[58]. Besides, in considering passenger traffic by each mode of transport, data reveal the absolute

domination of road transport since 1972[59]. The decline of both railway and inland waterway points to the fact that both are more concerned with freight transport activities. The emerging demand for passenger transport remains one of the key issues of the transport system in China. Although passenger traffic has expanded greatly since 1949, the Chinese are still relatively immobile. This low mobility is essentially the result of the low density of the transport network, its limited capacity as well as the low level of personal income. It follows that an increase in incomes and/or population growth will generate great pressures on the transport system, in terms of the number of people wanting to travel.

Scattered evidence suggests that the utilization rate of China's transport system is very high. This is particularly true with regard to the railway system. The best indicator of the intensive use of the railways is the average rail freight traffic density (ton-kilometre/route-kilometre). Rail freight traffic density increased from under 1.0 million ton in 1949 to over 12.0 million ton in 1983 or an average growth rate of 8.3 per cent per annum[60]. Although investment in rail transport has been given a high priority in the Chinese agenda, the rail network does not appear to have been extended to the point where average traffic densities have begun to fall. As a result, freight traffic density on rail is the second highest in the world after the Soviet Union and is hard pressed to keep up with growing demands[61]. Table 4.2 summarizes the rail freight traffic density for each municipality, province and autonomous region. The decrease in rail freight density westwards is noteworthy, from 40.4 million tons in Tianjin to 700 thousand tons in Qinghai, from 31.4 million tons in Hebei to 4.8 million tons in Xinjiang or from 31.4 million tons in Henan

TABLE 4.3: Road Transport in China's Provinces, 1983

PROVINCES	HIGHWAY DENSITY	FREIGHT DENSITY (million ton·km/km)	FREIGHT TRAFFIC PER CAPITA
Beijing	0.4796	0.12	5.06
Shanghai	0.3457	0.45	6.74
Tianjin	0.3294	0.24	5.71
Liaoning	0.2051	0.04	1.20
Jilin	0.1340	0.02	1.02
Anhui	0.2593	0.05	0.65
Hebei	0.2233	0.05	0.72
Shanxi	0.1788	0.05	0.93
Henan	0.2227	0.05	0.53
Shandong	0.2381	0.09	0.65
Hunan	0.2642	0.02	0.48
Heilongjiang	0.0966	0.02	0.94
Shaanxi	0.1842	0.02	0.88
Hubei	0.2499	0.04	0.91
Fujian	0.2870	0.03	0.67
Jiangxi	0.1842	0.02	0.44
Zhejiang	0.2140	0.05	0.61
Guizhou	0.1628	0.02	0.30
Guangxi	0.1414	0.02	0.44
Jiangsu	0.2131	0.08	0.80
Ningxia	0.1145	0.02	0.47
Sichuan	0.1485	0.03	0.45
Gansu	0.0719	0.02	0.29
Yunnan	0.1185	0.04	0.43
Guangdong	0.2989	0.01	0.41
Nei Monggol	0.0306	0.02	0.71
Qinghai	0.0217	0.02	0.50
Xinjiang	0.0139	0.05	0.39
Xizang	0.0180	0.02	0.23
MEAN	0.1879	0.06	1.16
STANDARD DEVIATION	0.1058	0.09	1.62

Source: Calculated with figures for length of highways, freight volume, freight traffic and total population in Statistical Yearbook of China 1984, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1983), p. 84, 274, 284, 287.

to 3.3 million tons in Yunnan. Freight traffic density on highways has grown from about 10 thousand tons in the early 1950's to 36 thousand tons in 1983, or an average growth rate of 3.9 per cent per annum[62]. This relatively low freight traffic density as well as the low rate of increase in freight traffic density over the years of road transport would indicate that given the predominance of the rural sector, labour-intensive and traditional means of transportation on roads still remain

important. This is partly supported by Table 4.3 where the importance of the municipality of Beijing, Shanghai and Tianjin is clearly demonstrated. Freight traffic density performed on inland and coastal waterways in 1983 was 1.663 million tons or 19.34 times greater than the 86 thousand tons registered in 1949, inland and coastal water transport traffic density therefore grew at about 9 per cent per annum[63]. This expansion of relatively slow and inefficient water transport would suggest that despite the fact that the length of navigable inland waterways has decreased over the years, inland water transport is still used in various regions for lack of another means of conveyance. Table 4.4 highlights the significant role played by water routes in the Changjiang delta. The remarkable use of the limited river system of Hebei province is also noteworthy. Further interpretations may be made if average freight traffic per capita is taken into consideration. Calculations based on official data indicate that between 1949 and 1983, the average freight traffic per capita on rail increased at 7.4 per cent per annum as compared with 6.5 per cent per annum on water and 5.0 per cent per annum on roads[64]. These figures may be compared with the annual growth rate of China's population of 1.9 per cent per annum[65]. The comparison suggests that there has been tremendous progress since 1949 in increasing the transport capacity of all modes of transport in China. Futhermore, it can be ascertained that the railway's contribution to the total freight transport sector is still the most important when compared with the other modes. Evidence shows that this is firstly because of the intensive use of railways in coal transport in certain provinces such as Shanxi and Ningxia, and secondly because of the binding constraint of heavy industry in other

provinces such as Liaoning, Jilin and Heilongjiang (see Table 4.2). On the basis of existing data Tables 4.3 and 4.4 highlight the contrast between the coastal areas and the hinterland in terms of average freight traffic per capita on roads as well as on water. So far as distance is concerned, in 1983 evidence indicates a general increase in average length of haul for all three modes. But it appears that both rail and inland water transport are long-haulage systems (560 km and 449 km respectively) compared to road transport (42 km). With regards to passenger transport, after a prolonged downward trend since 1949, the average distance travelled by rail (167 km) and water (56 km) generally reverse upwards since 1965. While the average distance travelled by road (32 km) is shortening. This suggests the fact that intra-urban and at most inter-urban rather than inter-province traffic is assuming greater importance. The performance of the system is impressive given that improvement in equipment capacity in China has not kept pace with the growth of traffic.

4.3 The Transport Equipment

One factor that affected the efficiency of operations in China's transport system was and still is transportation equipment. Traditional or primitive means of transport such as carts, animals, porters and sampans continue to exist alongside the modern transport system in China. Although these labour-intensive means of transport are slow, they provide China with the basic means for moving goods over very short distances, particularly in the densely populated East, in the mountainous regions and in the border provinces where they remain a significant feature of the transport scene. They also reflect capital scarcity in China.

The growth in the performance by the modern transport system has

TABLE 4.4: Water Transport in China's Provinces, 1983

PROVINCES	WATERWAY DENSITY	FREIGHT DENSITY (Million ton-km/km)	FREIGHT TRAFFIC Per Capita (Ton/Pop)
Shanghai	0.4056	0.75	1.856
Tianjin	0.0405	0.07	0.150
Beijing	0.0000	0.00	0.000
Liaoning	0.0035	2.03	0.035
Jilin	0.0041	0.04	0.004
Heilongjiang	0.0102	0.05	0.025
Shanxi	0.0011	0.00	0.000
Fujian	0.0323	0.66	0.316
Hubei	0.0437	0.82	0.454
Hebei	0.0003	34.38	0.050
Jiangsu	0.2353	0.51	1.145
Nei Monggol	0.0005	0.00	0.000
Zhejiang	0.1062	0.61	0.986
Anhui	0.0549	0.47	0.220
Shandong	0.0124	0.92	0.071
Henan	0.0066	0.18	0.017
Shaanxi	0.0034	0.03	0.003
Jiangxi	0.0296	0.36	0.183
Hunan	0.0484	0.31	0.440
Guangdong	0.0523	0.43	0.843
Qinghai	0.0000	0.00	0.000
Guangxi	0.0196	0.62	0.252
Sichuan	0.0144	0.29	0.147
Yunnan	0.0026	0.05	0.004
Gansu	0.0003	0.00	0.000
Ningxia	0.0000	0.00	0.000
Xinjiang	0.0000	0.00	0.000
Guizhou	0.0098	0.08	0.020
Xizang	0.0000	0.00	0.000
MEAN	**0.0392**	**1.51**	**0.180**
STANDARD DEVIATION	**0.0853**	**6.23**	**0.275**

Source: Calculated with figures for length of waterways, freight volume, freight traffic and total population in Statistical Yearbook of China 1984, comp. State Statistical Bureau (Hong Kong: Economic Information and Agency, 1985), p. 84, 274, 284, 287.

generally kept pace with growth in the industrial sectors of the economy especially heavy industry (see Table 4.5). In 1977, China's locomotive fleet consisted of 9,100 units. But China's railway system is exceptional among the world's major railways in that in 1977, 70 per cent of its locomotive fleet consisted of steam locomotives, with 29 per cent being diesel and only 1 per cent electric. In 1980, the total number of locomotives increased to 10,562 units.

TABLE 4.5: Inventories of Transport Equipment in China, 1949-1981

YEAR	LOCOMOTIVES				FREIGHT CARS	MOTOR VEHICLES		MERCHANT SHIPS						CIVIL AIRCRAFT
								Total		Ocean Going		Inland/ Coastal		
	Total	Diesel	Steam	Electric		Total	Trucks	Number	Deadweight Tonnage	Number	Deadweight Tonnage	Number	Deadweight Tonnage	
1949			4,000[f]		46,000[f]									
1950														
1951														
1952	3,300[a]	0[a]	3,300[a]	0[a]	58,000[a]			101[a]	270,000[a]					
1953														
1954														
1955														
1956														
1957	3,700[a]	0[a]	3,700[a]	0[a]	86,000[a]			93[a]	302,000[a]					
1958														
1959														
1960														
1961										20[c]	180,000[c]			
1962														
1963														
1964														
1965	5,400[a]	0[a]	5,400[a]	0[a]	143,000[a]			174[a]	933,000[a]	41[c]	380,000[c]	133[ac]	553,000[ac]	
1966														250[d]
1967														
1968														
1969														
1970	6,400[a]	700[a]	5,700[a]	0[a]	175,000[a]	434,000[b]		269[a]	1,944,000[a]	70[c]	750,000[c]	199[ac]	1,194,000[ac]	
1971	6,700[a]	900[a]	5,800[a]	0[a]	185,000[a]			305[a]	2,290,000[a]					400[h]
1972	7,100[a]	1,100[a]	5,900[a]	100[a]	197,000[a]			329[a]	2,657,000[a]					
1973	7,500[a]	1,400[a]	6,000[a]	100[a]	209,000[a]			368[a]	3,291,000[a]					
1974	7,900[a]	1,700[a]	6,100[a]	100[a]	222,000[a]			430[a]	4,592,000[a]					
1975	8,300[a]	2,000[a]	6,200[a]	100[a]	237,000[a]	918,000[b]		495[a]	6,082,000[a]	214[c]	4,040,000[c]	281[ac]	2,042,000[ac]	
1976	8,700[a]	2,300[a]	6,300[a]	100[a]	251,000[a]			556[a]	7,081,000[a]					
1977	9,100[a]	2,600[a]	6,400[a]	100[a]	267,000[a]	1,199,000[b]		642[a]	8,244,000[a]	365[d]		277[ad]		
1978	9,675[b]				269,300[b]	1,358,000[b]								
1979	10,149[b]				282,600[b]	1,554,000[b]								
1980	10,562[b]				290,400[b]	1,747,000[b]	1,300,000[e]		10,920,000[bc]	431[c]	7,920,000[c]		3,000,000[b]	
1981						1,780,000[e]								

Sources:

a U.S., Central Intelligence Agency, National Foreign Assessment Center, China: Economic Indicators a Reference Aid, Pubn. No. ER 78-10750 (December 1978), p. 37.

b Albert S. Peterson, "China: Transportation Developments, 1971-80", in U.S., Congress, Joint Economic Committee, China Under the Four Modernizations, Part 1, Joint Committee Print, 97th Cong., 2nd sess. (Washington, D.C.: Government Printing Office, 1982), pp. 144, 152, 160.

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h Philip W. Vetterling and James J. Wagy, "China: The Transportation Sector, 1950-71", in U.S. Congress, Joint Economic Committee, People's Republic of China: An Economic Assessment, Joint Committee Print, 92nd Congress, 2nd sess. (Washington, D.C.: Government Printing Office, 1972), p. 171.

Motive power is a critical element in railway planning for reasons related to energy. Burning coal in steam locomotives is a low efficiency and unecomonical form of coal utilization. Futhermore, steam engines have capacity constraints and distance limitations in dry areas, mountainous regions and tunnels. Therefore, a significant shift towards the higher heat efficiency of diesel and electric locomotives would provide the solution for heavy traffic lines. But, in view of China's current prospects for petroleum, an emphasis on diesel would not be desirable if it would mean importing fuel from a world market that is already experiencing an inadequate supply of diesel worldwide. Considering China's potential for hydro-electric power development, electrification would offer energy independence and relatively low operating costs. But rail electrification requires very high initial capital outlays which in the case of China can only be implemented over a long period. With regard to freight cars, the railway system operated 290,400 freight cars in 1980 as compared to 46,000 in 1949, a 6.3 fold increase.

Since 1970, all autonomous regions, provinces and municipalities have been producing their own motor vehicles according to the principles of self reliance, indigenous methods, the integration of native methods with foreign ones and technical innovations. As a result, the vehicle fleet has increased dramatically sice 1970. The total number of motor vehicles of 1,780,000,of 1981 is 4.1 times that of 1970. Still, this is an extremely low number of motor vehicles for its represents less than 18 vehicles per 10,000 persons.

The past decade has seen a dramatic increase in China's merchant ships inventory. Indeed, it has been reported that China's merchant ships in 1980 totaled 10,920,000 deadweight tonnage or 5.6 times that of

1970. Besides, the total capacity of the Chinese-controlled ocean-going merchant fleet has grown from 20 vessels with an estimated total of 180,000 deadweight tonnage at the end of 1961 to 431 vessels with 7,920,000 dead-weight tonnage at the end of 1980. Since the nineteen-seventies China has not only produced more ships, but also has continued to purchase secondhand vessels for refitting in Chinese shipyards. The main objective of this increase of China's ocean fleet is to capture and control a substantial proportion of the shipment of its foreign trade. Parallel to this growth in overseas transport, China's inland and coastal fleet jumped from 133 vessels with 553,000 deadweight tonnage in 1965 to an estimated 3,000,000 deadweight tonnage in 1980. The role of traditional junks and small powered boats and barges still remains significant on tributaries of many rivers. China's machinery and transport equipment imports accounted for over 18 per cent of the total value of imports in 1983[68].

Additional investments that would be needed in both infrasctructure and equipment for the various transport modes, to move additional traffic in the future are likely to be substantial and are at the core of any future transport plan.

5. CONCLUSION: Transport and Territorial Development

The pattern of transport development since 1949 and the roles played by the different modes in China are the outcome of basic policies related to territorial development. These policies meant that various decisions were made about the size, modal distribution and location of transport sector investment with a view to achieve territorial integration and geographic modernization. The policies of China's new regime after 1949 emphasized territorial integration. Integration was desired for a variety of ideological and tactical reasons. More importantly, it was considered a necessary precondition for any far-reaching economic goals. Consequently, a maximum development of centralized institution and central policy making was championed as an end in itself. This process consists of an increasing concentration of power in the state and as such emphasized vertical links to the centre.

The new government inherited an economy which was highly differentiated geographically. As in so many developing countries, the territorial development of China has been marked by colonization. In the decades prior to 1949, treaty ports were developed along the coast, in the Liaohe valley and along the navigable Changjiang. More specifically, they contained the bulk of China's industrial enterprises, labour force and output in the modern sector of the economy. But, these port cities were mainly created for foreign benefit, as a means for exploiting China's resources while contributing little to the development of the country as a whole. As a result, the foreign enclaves created by the treaty port legacy produced a territorial pattern of unequal urban and industrial growth which made the goal of geographic modernization particularly difficult. In view of this the

Chinese authorities made considerable efforts in order to achieve the ultimate goal of regional equity in economic developemnt. Since 1949, Chinese territorial planning has changed considerably. Early statements by the new regime spoke of plans to dismantle the coastal area industrial plants and distribute them in neglected provinces and autonomous regions of the interior, in order to achieve a balance in China's territorial development. Until recently, the central government made serious and sustained efforts to change the basic territorial pattern of coastal dominance. Emphasis was put on the development of small scale industries with intermediate technology in rural areas. Major urban growth shifted to the small and medium size cities located in the inland provinces and autonomous regions. The expansion of China's transport system can attest to that development. With the launching of the Sixth Five-Year Plan (1981-1985) however, under the four modernization programs, the pendulum of China's territorial policy has begun to swing back again. The main territorial objective of the present strategy is to build two major economic zones: one in the Changjiang delta which will centre around Shanghai; and the other one in North China around Shanxi province. The latter will concentrate on the development of the coal, chemical and other heavy industries[66].

Parallel to this, prominent Chinese officials have emphasized the importance of making full use of the advantages of China's coastal areas, especially the coastal cities, to expand economic and technological exchanges with foreign countries[67]. The formation of China's special economic zones is one manifestation of this policy orientation. The stress on foreign trade and technology and the practical consideration of economic efficiency are providing favourable conditions for the coastal areas to regain their primary role in the

development of China's modern economy. This shift in territorial policies will undoubtedly have important implications for investment allocations within the transport sector. But even though major changes in the spatial pattern of industrial concentration have not been achieved, it would be a serious mistake to conclude that the decentralization policies have failed. Indeed, if not for the implementation of decentralization policies, there would have been greater polarization around the coastal areas. The Chinese experience points out firstly that decentralization of industries is difficult and reasonable results cannot be expected until after a long time. Secondly, the present emphasis on the coastal areas might be interpreted as only a phase in the progressive resolution of the core-periphery conflict. Recent development tends to support the idea that the Chinese are solving territorial contradictions by implementing a dynamic strategy of territorial development with regards to their transport system. Roads are being upgraded simultaneously in coastal cities and rural areas of the interior. While Changjiang ports are opening to international trade; work has already started on extending China's northernmost railway in Xinjiang, 200 kilometres west of Wusu[69]. Can this be interpreted as a possible solution to the mechanisms of uneven territorial development? The answer will come only with the emerging reality of China's geographic modernization.

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